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# **SERIE** RESEARCH MEMORANDA

## **Domain knowledge as corporate** resource of financial firms

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# **DOMAIN KNOWLEDGE AS CORPORATE RESOURCE OF FINANCIAL FIRMS'**

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**Abstract:** It is almost a cliché to say that we live in a knowledge society and that knowledge is an important resource of firms in their production of goods and provision of services to their clients. However it is not so easy to find many examples showing the use of domain knowledge in financial companies. This paper reports the case of how a vehicle lease company in the Netherlands combines the use of domain knowledge and information technology into an expert system to automate the control of vehicle maintenance activity. The results benefit all parties concerned. The lease company can control the vehicle repair and maintenance works more efficiently. For the customers, it is higher rate of vehicle utilisation, greater safety and lower costs. The dealers who carry out the repairs and maintenance can do their work faster, and are paid immediately and automatically via the banks, resulting in lower administrative costs.

The case story suggests that domain knowledge can be perceived as a corporate resource and its utilisation can produce values for the stakeholders. We propose that financial firms (1) see themselves as knowledge system, as a network of knowledge nodes serving their customers, (2) consider knowledge intensive firms as their role models. We draw on an idea of Friedrich Hayek who perceives the economic problem of society as a problem of the utilisation of knowledge not given to anyone in its totality. The paper concludes by discussing some organizational obstacles on the road to re-invent banks into knowledge systems.

**Key words:** financial firms, domain knowledge, information technology, value added services, efficiency, Hayek.

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. A shorter version of this paper was accepted by the Wolpertinger Conference in Lisbon, Portugal 1-4 Sept 1999 after the usual blind review. However it was withdrawn at the last minute because none of the authors could attend the conference.

## 1 INTRODUCTION

It is generally accepted that knowledge represents an important input for production of goods and provision of services. Its implications for the way we run our society are so far-reaching that some sociologists use the term *knowledge* society to characterise our society (Drucker 1990; Castells 1996). “The biggest shift, bigger by far than the changes in politics, government, or economics, is the shift to the knowledge society in all developed non-communist countries. (Drucker 1990, p. 167)”

Knowledge may be understood as a set of organized statements of facts or ideas, presenting a reasoned judgement or an experimental result, which is transmitted to others through some communication medium in some systematic form (Bell 1973, p.175). Though the idea that knowledge is a valuable resource to firms and should be cleverly used as such, there are not many examples of this idea in the financial sector. We like to illustrate the possibility of putting this idea into practice by describing the case of how a vehicle lease company in the Netherlands has successfully combined its domain knowledge about vehicles and the use of information technology. The results benefit all the parties concerned – improved operational activity of Lease Company and efficiency of the vehicle dealers. Most important of all is the way the customers are enjoying the benefits: higher rate of vehicle utilisation, greater safety and lower costs.

We proceed to reflect the implication of this for the whole financial sector. Some of the traditional activities of banks are in fact knowledge intensive, for example, vetting and tracking of growth companies, identifying export opportunities in foreign markets and partnership abroad. It would be fruitful to explore ways to deepen and extend such traditional knowledge intensive activities. If knowledge of business served by banks, the economy and the broader business environment is consciously used as a resource to serve its customers, the banking sector has a very useful function to fulfil and a bright future ahead. Role models of the bank have been the military, especially its command hierarchical structure, and the production firm. Its role model in the future should also include the knowledge intensive companies like McKinsey and Andersen Consulting. Further we draw

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on the writings of Hayek to inform our perspective on a financial firm as a knowledge system. In his view, the economic problem of society is a problem of utilisation of knowledge not given to anyone in its totality. There are some difficulties to overcome before general banks can effectively operate knowledge-intensive services. The nature of these problems is essentially organizational, encompassing culture and structure.

The rest of the paper is structured as follows: the next section describes a core operational activity of a Dutch lease company. Section 3 discusses how the use of the domain knowledge and information technology has benefited all the parties concerned. The possible implications of this are discussed in section 4. This is followed by the concluding section.

## **2 A CORE OPERATIONAL ACTIVITY OF LEASE COMPANY**

Lease Company (a fictive name of a real company) is a financial firm in the Netherlands specializing in leasing vehicles to business organizations like Philips and government agencies like the police force. Lease Company buys fleets of vehicles at a discount and leases them to its clients. The vehicles can be cars, trucks, vans, buses and forklifts. The actual drivers of these vehicles are then the employees of Lease Company's clients.

The core activity of Lease Company is operational leasing of cars. Operational leasing means, that instead of financial lease the Lease Company takes a residual risk. Only the difference between the investment at the beginning and the estimated residual value is financed. The residual value of cars is estimated based on the knowledge of the car and its type.

The lease price is based on the estimated number of kilometers to be driven during the total lease period. Because of this it is of utmost importance that Lease Company knows how many kilometers are driven during a certain period. This information becomes available when fuel cards are used but in any case when the car undergoes maintenance. This means that the car should be maintained at the normal intervals as

prescribed by the manufacturer of the car. A good relation between the garage dealer and Lease Company is necessary for providing high quality services to the customers.

Lease Company has signed contracts with vehicle dealers who carry out repair and maintenance works. The costs of such services are standardized and are clearly recorded in handbooks. Lease Company adopts what is called an open calculation method to charge its services to its clients. The clients pay a lease price which is the standard rate in the industry. However, if the actual costs of managing a given vehicle (namely administrative costs, insurance, depreciation, repairs and maintenance) turn out to be less than the standard lease price, Lease Company will return the difference to the client. Should the actual costs be higher, then it is the problem of Lease Company. This method is to the benefit of both parties. It gives the business clients an incentive to encourage their employees to take good care of the vehicles, which generally ends up with less repair and maintenance costs for Lease Company.

The open calculation method entails a risk for Lease Company. The dealer might repair the wrong things or even carry out unnecessary repair and maintenance works. Since Lease Company has assumed the risk for the maintenance costs it is necessary that the repair and maintenance works are approved beforehand by Lease Company. To cope with this activity, Lease Company set up a maintenance department manned by people who have a deep understanding of the vehicles leased out to its clients. Let us call them vehicle maintenance experts.

This department at Lease Company processes all incoming requests for vehicle maintenance and subsequent invoices. The process is as follows. A driver turns to his dealer for servicing. The dealer then contacts the maintenance department to ask for permission. When a maintenance expert at Lease Company receives a request he checks the vehicle's maintenance history. Based on pre-agreed norms he approves or disapproves the request. In their judgement the experts take in consideration the followings: earlier repairs, previous mileage rate, special agreements, and exploitation yield, price of repairs, and number of miles covered. This process took place by phone and imposed a heavy workload on the experts. Besides this they also checked the invoices from the garages because not all repairs had been approved of in advance. The amount of time spent on these two tasks was about 50% - 50%.

At the end of the 1980's the number of leased vehicles increased to an extent that telephone calls to the maintenance department jammed its telephone exchange, especially during morning. It was frustrating to the dealers, hectic to the maintenance experts and delay for the vehicle users. The rule that no approval was required for maintenance below 250 Dutch guilders was proposed to resolve this problem, but it did not fit Lease Company's philosophy. The dealers were quite forthcoming in their complaints about the delay. It was to the credit of the Lease Company that this was well received and serious effort was undertaken to resolve the bottle neck. The upshot was the development of an expert system incorporating the knowledge of the experts into a rule based system which has a large database containing all the data related to the history of the vehicles managed by the company. The organizational difficulties of developing and introducing the system have been reported elsewhere and need not detain us here. For those interested, please refer Peters et al (1995) and Zanten et al (1997).

### **3 COMBINING DOMAIN KNOWLEDGE AND INFORMATION TECHNOLOGY**

The functions of the computer-based expert system consist of the followings:

It supports the vehicle dealers in keying in their requests for repair and maintenance works and sends them through the modem to Lease Company.

When Lease Company receives a request, the expert system checks the identity of the dealer, the identity of the vehicle and retrieves the data related to the background of the vehicle from the database.

After the first two steps have proceeded without trouble, the expert system processes the content of the dealer's requests. If deemed necessary, it may give advice to the dealer. In minority cases when the expert system cannot handle the questions, the dealer's requests will be passed on to the human expert.

When the dealer has finished the repair and maintenance works, he sends a message to the expert system. Upon receiving the message, the system updates the vehicle database and instructs its bank to make payment to the dealer.

- The expert system analyses regularly the database containing the data about the repairs, maintenance and history of usage of the vehicles. And based on the analysis it gives advice to clients of Lease Company on pro-active maintenance works.

The expert system was fully operational in the first quarter of 1996. In the beginning, 40-50% of the dealers' requests was handled by the system. Currently, approximately 800 requests are being processed per day, with the expert system taking care of 65% of the cases. The final goal is to increase the figure to 80%, which is to be achieved along the following process. As the human experts learn more about the vehicles partly with the help of the expert system, they incorporate the knowledge into the knowledge base of the system. In other words, both the knowledge level of the human experts and the expert system are evolving and improving together. The system needs 20 seconds to handle one request and a human expert needs approximately 2.5 minutes; these figures are still improving every year. The results are rewarding and very encouraging, which have led to the same system being installed in a sister company of Lease Company in Belgium.

Below we would like to sum up the benefits of the system for the parties concerned.

Advantages of the expert system for Lease Company are:

1. requests from the dealer-garages are handled almost instantaneously
2. the answers are consistent
3. large volumes of requests can be handled without corresponding increase in costs
4. pro-active maintenance is made feasible
5. human experts have time to reflect on difficult cases, thereby enhancing their own knowledge and the knowledge base of the expert system. This represents an improvement in performance over time.
6. use of the expert system for training new personal in the repair and maintenance department

Advantages for the dealer-garages are:

1. instantaneous reply to requests in most cases



## 2. lower administrative cost

Advantages for the clients of Lease Company are:

1. more efficient use of the vehicles
2. faster repair and maintenance
3. lower lease price
4. higher rate of vehicle utilisation
5. greater safety

By a skilful combination of domain knowledge and IT, Lease Company achieves some features of what Schonberger (1990) defines as world class excellence, namely continual improvement in serving the customer's four basic wants: ever-better quality, ever-lower costs, ever-increasing flexibility, and ever-quicker response. In addition, it provides an empirical support for the following argument of Senn (1998): "Information technology itself offers little competitive advantage to a company, but when combined with people's know-how, it can redefine the nature of a company's products and services and the way the company carries out its production activities. Together, information technology and know-how can produce a substantial advantage in the marketplace. (p.652)"

## 4 DOMAIN KNOWLEDGE AS RESOURCE OF BANKS

The previous two sections report the functioning of Lease Company mainly from the viewpoint of knowledge. They illustrate the merit of focusing on the dimension of using expert knowledge about vehicles (what is often known as domain knowledge in artificial intelligence literature). In this section we would like to reflect on the implications of viewing financial firms as knowledge intensive business systems, or in short knowledge systems. To keep it within the length of a paper, we would confine ourselves to looking at banks.

Before we proceed further, we would like to ask the questions: How can banks be seen as knowledge intensive companies? Why is the need to do so increasingly important? To answer the second question first. In the last three to four decades, a

profound and irreversible revolution has occurred in the world's financial markets and institutions; the hall marks of this change are innovation, globalization, and deregulation (Fabozzi et al 1994). A direct result of such changes are more intense competition, accompanied by widespread use of IT. In the way which most commercial banks are managed, traditional sources of bank revenue are not longer laying the golden eggs. At the same time shareholders are demanding greater return to their investment. What we see then are the reduced importance of interest spread as an income for banks compared to the increased importance of off balance sheet income like commissions, and fees that are typically based on knowledge intensive activities (mergers, acquisitions, project finance). For example, non-interest income from fees and trading as a proportion of American commercial banks' total income increased from an average of 19% in 1960-80 to 35% in 1994 (Edwards and Mishkin 1995). Increased global competition has forced the banking business to focus on value added services for business clients. Extensive use of information technology in consumer banking (call centers, electronic banking, the Internet) is shifting the orientation of banks to focus on value added services in this segment as well. In addition, current economic climate (especially the increased economic instability) forces banks to spend an increasingly amount of time and effort in the risk management of their activities. Some of these have been emphasized in the recent survey on international banking by ***The Economist*** (Cookson 1999).

How can banks be seen as knowledge intensive business systems? There are only a few businesses, which are well placed to understand pretty well what their customers are doing. One of these is the banking industry, by virtue of its roles in the payment system and in the financial activities of their clients. In itself, knowledge of the payment and financial activities of its clients have been used to advantage in the past to generate handsome profits for the banks. But within a more competitive environment, this has to be combined within an intimate knowledge of the business conducted by the clients and the network possessed by the banks. In this sense banks may be perceived as knowledge networks. The need for such services is not an academic issue. (Please refer to the appendix for a story related to us by a friend in the banking sector.)

In a way banks and other financial institutions are already using knowledge about the clients' business. Two examples are sufficient here. The first is provided by a careful reading of Saunders (1994) who identifies risk management and information management as the two major tasks of financial institutions. Competent information management cannot be divorced from business knowledge, as evidenced from the recent interest in use of data mining technology to supplement database technology. Credit risk analysis requires in-depth knowledge of the business. This is perhaps best provided by the work of venture capital, which must have an in-depth knowledge of the business.

Besides risk assessment, the venture capitalists play an indispensable role in nurturing the new start-ups. In the USA the role of venture capital in providing high-tech companies is well known, especially in the Silicon Valley. Venture capitalists with expertise in a particular technological area take an equity stake and provide various aspects of management support. They help the company to reach a suitable size for stock exchange listing. The active involvement of respected and competent venture capitalists is a statement of quality warranty for other investors who come in to buy the stock.

In the more "traditional" activities, we can think of knowledge-intensive services provided by banks, namely vetting and tracking of growth companies, assisting clients in finding partnership abroad, identifying export opportunities, financing international project oil pipelines in Russia and big dams in China. An important point to emphasise here is that banks need to **consciously** see itself as a knowledge network to serve its customers. The function of a bank employee includes acting as a sort of financial advisor to small and medium businesses. He cannot carry out this function well if he does not have an in-depth understanding of their clients' business. We may call this customer-centred or customer-oriented approach. Though every financial management is present in every business organization, a financial manager must possess the domain knowledge of his company if he is to function well. In the same way, banks which provide financial services need to understand the details of the business of their clients. A parallel could be drawn in the world of information technology. A person can earn a professional degree in computer science without any knowledge of economics, chemistry or whatsoever. But in order to function well as an IT professional in the world of petrochemical industry for

example, he must have an in-depth knowledge of the industry. Such awareness has seeped through the IT world to become common knowledge and is transmitted to college students during their study. The same has yet to happen in the world of banking as well as college education on banking and finance. However, a pioneering effort in this direction has been made by the World Bank whose emphasis in this new area appears quite often in the mass media. The Bank is in the explicit business of lending money for development and helping countries obtain their financing. In the process, it collects and conveys information and knowledge relevant to the development. In recognition of the value of this implicit role, the Bank is embarking on an ambitious project of knowledge management. The project aims to bring the Bank's collective knowledge to specific projects, to connect the people who have the experience and knowledge with those who need it, both inside and outside the Bank, etc. It includes the use of new information technology such as the Internet to support the endeavour. For more information, please visit the Bank's **website** [www.worldbank.org](http://www.worldbank.org).

The role models of the bank have been the military, especially its command hierarchical structure, and the production firm. Its role model in its activity as a knowledge network becomes the knowledge intensive companies like **McKinsey** and Andersen Consulting. If we are to broaden our sources of learning, we can include the activities related to the collection and communication of information by the mass media, libraries, professional and academic associations.

In a more theoretical formulation, banks are to play a role besides the neo-classical approach of the efficient allocation of monetary resources. They need to support the efficient use of knowledge dispersed among economic agents, an activity given central importance by Hayek. The economic problem of society is a problem of the utilization of knowledge not given to anyone in its totality (Hayek 1945). He refers to the problem as one of division of knowledge, quite analogous to division of labour (Hayek 1937). We are witnessing the interaction of a number of business units, each possessing only fragment of knowledge. This interaction brings about a state of affairs which could be brought about in a deliberate direction only by some organizations which possess the combined knowledge of all those business units. Hayek was anticipating the *modus operandi* of present-day

network organizations and was speaking their language. He further argues that "The peculiar character of the problem of a rational economic order is determined precisely by the fact that the knowledge of the circumstances of which we must make use never exists in concentrated or integrated form, but solely as the dispersed bits of incomplete and contradictory knowledge which all the separate individuals possess. The economic problem of society is thus not merely a problem of how to allocate 'given' resources . . . It is rather a problem of how to secure the best use of resources known to any of the members of society, for ends whose relative importance only these individuals know (Hayek 1945, p.519-520)."

## **5 DISCUSSION AND CONCLUSION**

As this is a short paper we would not follow the usual convention of summarising the main points. Instead we would like to pose a simple question. If treating knowledge as a corporate resource can offer new ways to serve their clients and to increase revenue, why are banks and other financial firms not doing it? Well, investment banks have a good track record of operating like a knowledge intensive company, and the same applies to venture capital. For the case of general commercial banks, two reasons are suggested here. Firstly, **ccommercial** banks still operate with the mentality of the good old days when they are pretty well protected. Though the competition has been more intense of late, they are still operating within a rather comfortable business environment. They still levy charges to their clients which bear little relation to the costs they incur. And witness the bail outs by governments if big banks are threatened with bankruptcy as a result of huge non-performing loans. And even with the advent of modern information technology the entry barrier to establish a viable banking business is considerable. Thus on the question of efficiency, prudence and cost management, there is much improvement to be made; the best evidence of this point is provided by the good performance of Lyolds TBS Bank of the UK. Secondly, the general banks are used to operating like old fashion manufacturing concerns with their strict division of functions and departments. It is a common observation of academic researchers of banks that they know more people in the various departments of a general bank than these employees of the bank among themselves. One researcher once jokingly told the first author that he has been used as a communication

channel by middle level managers of the bank he is studying. Added to this is the habit of the bank functionaries not to pass on their clients to other departments, even though they are aware that they would not lose any revenue and that their clients would profit from the contact. That is why we argue that banks have to re-think about their role' model as far as their role as knowledge system is concerned. Lest it be r&-understood, we are not suggesting that these banks should dump their very crucial role in payment system and credit management where the boring machine model can be more useful.

But treating knowledge as a valuable corporate resource requires another **mindset**, another organizational culture and structure. From the perspective of knowledge, a bank is less a company of physical assets than it is a company of knowledge. A bank is a sort of knowledge base or better still knowledge bank. It can provide knowledge, experience and information to its clients. To paraphrase **Decartes**, it *is* what it *knows*. This sounds rather outlandish if not too radical. However, this idea has been aired in a slightly different form by **Walter Wriston**, long-time chief executive officer of Citibank and one of the foremost American bankers. He has an unconventional view on the value of capital and employees of banks, namely that *capital can be an inconvenience for banks*. In his considered opinion, it is the brains of its employees which constitute the real capital of a banking enterprise (Zweig 1995). Without much risk, this comment can be extended to other financial firms.

### **A Problem in Moscow**

A Russian businessman went to the chamber of commerce and industry in Moscow and said to the functionary in charge, “I have the following problem. I have lots of wool that I would like to process into apparels instead of selling them cheap as raw materials. But I have no money to buy the processing plant and no bank is willing to give me a loan. Can you find someone willing to exchange his plant for the finished wool product, a sort of barter trade.” The functionary could not help him but he referred him to some western banks operating in Moscow. All these banks noted down his request.

After a week or so, the replies came “Sorry we could not help you.” However, one bank was lucky to have an employee who took the initiative to phone his colleagues stationed in countries with wool industry. Finally a colleague referred him to a wool company which has some idle production capacity. To cut the story short, the deal was finally clinched, due mainly to the initiative and hard work of a bank employee.

This story was related to us by an old friend who has worked in the banking sector for more than thirty years. He heard the story from his colleagues in Moscow. To quote him, the story may be real or not real, but the nature of the problem is very real. And banks like to project themselves through advertisements in business magazines that they can offer solutions to such problems. However, the operation systems of banks are not geared towards tackling such tasks. This is a pity. By virtue of their presence in many countries and the nature of their business, global banks are in a good position to help solve the kinds of problems encountered by the Russian businessman. Such banks would do well to build an information-cum-knowledge system to serve information and knowledge needs of their clients.

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